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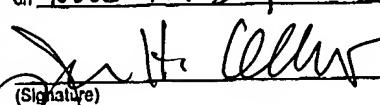
## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

*Customer No.* 54,621  
*Group:* 3746  
*Confirmation No.:* 4009  
*Application No.:* 10/613,290  
*Title of Invention:* CONSTANT VOLUME COMBUSTOR  
*Inventor:* Philip H. Snyder et al.  
*Filed:* July 3, 2003  
*Attorney Docket:* RORO-199  
*Examiner:* Ehud Gartenberg

Certificate Under 37 CFR 1.8(a)

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

on November 30, 2005

  
(Signature)

John H. Allie  
(Printed Name)

### DECLARATION OF PHILIP H. SNYDER REGARDING PATENT APPLICATION

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

I, Philip H. Snyder declare as follows:

1. I am an inventor in U.S. Patent Application No. 10/613,290 entitled CONSTANT VOLUME COMBUSTOR.
2. I have a Bachelor of Science, Masters of Science and a Doctorate of Philosophy in Mechanical Engineering from Purdue University.
3. I am a Rolls-Royce Engineering Associate Fellow for Aerothermal Systems as of January 2004.

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4. I have over twenty years of professional work experience in research and development in fields related to advance mechanical design, fluid dynamics and heat transfer.
5. Rolls-Royce North American Technologies, Inc. employs me as a Propulsion System Integration Technical Specialist.
6. I am familiar with pulsed detonation and wave rotor technologies. I am very familiar with the U.S. Patent Application No. 10/613,290 and have studied the Office Action dated May 31, 2005.
7. Upon review of the Office Action dated May 31, 2005, I understand the Examiner is objecting to the specification because of teachings that he has indicated lack credibility. I respectfully disagree with the Examiner's positions regarding credibility for at least the reasons set forth below.
  - A) The Examiner objected to language on page 10, lines 15-16 that provides the working fluid is selected from a group including oxygen, nitrogen, carbon dioxide, helium or a mixture thereof, and more preferably is air. The working fluid contemplated in the present patent application must contain oxygen to be used to oxidize the fuel. As the Examiner has noted a person of ordinary skill in the field of combustion technology will recognize that an oxidizing agent must be present in the working fluid. In the sentence at issue the language could possibly be written clearer so that the working fluid was defined as: oxygen; or oxygen and one or more of nitrogen, carbon dioxide and helium; or air. In order to

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eliminate any doubt the working fluid will contain oxygen and may contain other gases such as nitrogen, carbon dioxide and/or helium. I respectfully disagree that the cited language creates a lack of credibility for the present patent application specification.

- B) The Examiner objected to language on page 10, that the invention contemplates a pulsed deflagration combustion process. A person skilled in combustion technology applicable to pulsed detonation engines would understand that there is recognized a continuum between detonative combustion and deflagration combustion. Deflagration combustion is understood to comprise variants such as fast deflagration and slow deflagration. The fast deflagration combustion process creates waves that travel at sub-detonation speeds but greater than the speed of sound and create strong pressure and shock waves. The type of wave produced in a fast deflagration combustion process is applicable to forms of the present invention. I respectfully disagree that the cited language creates a lack of credibility for the present patent application specification.
- C) The Examiner objected to language on page 11, line 4, regarding that the aircraft can be an unmanned space device. The present application specifically contemplates and discloses that the working fluid may be carried onboard the aircraft in an oxidizer and working

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gas storage tank. The disclosure of the carrying of the working fluid onboard the aircraft in a tank will clearly enable the operation in a vacuum. I understand that the term unmanned space device is also used to describe vehicles that operate at high altitudes; these high altitudes are within the earth's atmosphere and contain sufficient oxygen to enable the desired combustion processes. I respectfully disagree that the cited language creates a lack of credibility for the present patent application specification.

- D) The Examiner objected to language on page 14 that states the present invention contemplates rotational speeds up to 100,000 revolutions per minute, that are in excess of 1,600 revolutions per second. The Examiner further went on to provide that it is his opinion that centrifugal forces would rip the invention apart at speeds very much lower than said speeds. For the sake of clarity, I wish to repeat the appropriate language from the patent application specification. The patent application specification discloses that "[o]ne form of the present invention contemplates rotational speeds of the rotor within a range of about 1,000 to about 100,000 revolutions per minute, and more preferably about 10,000 revolutions per minute." P. 14, L. 22- P. 15, L. 1.
- The high end rotational speeds questioned by the Examiner are presently applicable in some forms of turbo machinery; such as automobile turbochargers. In analyzing a rotating structure for

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centrifugal loading the stresses of concern are proportional to rotational speed and the radius of the apparatus. As the Examiner shall appreciate the utilization of a relatively small radius will allow the corresponding utilization of relatively high speeds. Further, the present invention utilizes a rotor having a hoop continuous outer structure that is also very compatible with high speeds.

The Examiner has asked about contemplated designs coming close to the indicated rotational speeds. I have contemplated applications at these speeds, such as nano-technology including rotating components having a radius in the nanometers. I respectfully disagree that the cited language creates a lack of credibility for the present patent application specification.

- E. The Examiner objected to the language on page 28, lines 11-12 that "[t]he admission of gas via port 222 can be accomplished via a shock wave." The gas exiting via port 222 receives the high pressure buffer/energy transfer gas through the buffer gas outlet port 224. This gas upon exiting the port 222 has a higher pressure than the pressure within the working fluid in passageway 41. With the exiting working fluid having a pressure sufficiently higher than the pressure of the working fluid in the passageway a shock wave is set up. The working fluid flows into the passageway 41 behind the shockwave.

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I am of the opinion that the admission of gas via port 222 and the creation of the shock wave would be clearly understood by one of ordinary skill in the field of the present invention.

8. Upon review of the Office Action dated May 31, 2005, I understand the Examiner has rejected claims 1-11 under 35 U.S.C. § 112, first paragraph as failing to comply with the enablement requirement. I understand that enablement relates to the specification teaching one of ordinary skill in the art how to make and use the invention. The invention that must be enabled is the claimed invention and not aspects of the invention for which patent protection is not being pursued. More specifically, the general policy of the enablement requirement is to insure that the invention is communicated in such a way to enable those skilled in the art to make and use the invention. I strongly disagree with the Examiner's position that I have not enabled the invention of claims 1-11.

- A. Upon my review and study of the enablement rejection on pages 3-5 of the present Office Action it appears the Examiner is not comfortable with space-time (wave) diagrams utilized by those of ordinary skill in the pressure wave art. I attest that those skilled in the art of pressure wave technology utilize an unrolled view of the ports and passages in the manner shown in figures 8 and 12-16. This type of illustration is conventional to those skilled in the art and necessary to provide a time and spatial sequencing for the reader.

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In contrast to looking at the space-time (wave) diagrams as inseparably linking the time and spatial sequencing the Examiner appears to view the space-time (wave) diagrams as only a "spatial representation of the operational time sequence of the invention." I base my conclusion as to the Examiner's unfamiliarity/lack of comfort with space-time (wave) diagrams upon the statements in the Office Action. For example, the Examiner is demanding the amendment of Figure 7 to include all of the feature numbers listed in the first paragraph of page 27. This is entirely contrary to the generally accepted techniques of describing pressure wave technology. The illustration that would result from the Examiner's requested amendment to figure 7 is not practical and in my opinion would result in creating confusion to a reader skilled in the art. More specifically, the resulting illustration would increase complexity and not facilitate a better understanding of the present inventions. The space-time (wave) diagrams are the appropriate means to inform people skilled in the art of pressure wave apparatus regarding the present invention.

9. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are

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believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Nov 29, 2005

Date



Philip H. Snyder